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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,997	12/02/2003	Toshihiro Takahashi	246090US2	3157

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EXAMINER	
WEISKOPF, MARIE	
ART UNIT	**PAPER NUMBER**
3661	

DATE MAILED: 01/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/724,997	TAKAHASHI ET AL.	
	Examiner	Art Unit	
	Marie A. Weiskopf	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/2/03* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/7/05$12/2/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 8/27/2004 fails to comply with 37 CFR 1.98(a)(1), which requires the following: (1) a list of all patents, publications, applications, or other information submitted for consideration by the Office; (2) U.S. patents and U.S. patent application publications listed in a section separately from citations of other documents; (3) the application number of the application in which the information disclosure statement is being submitted on each page of the list; (4) a column that provides a blank space next to each document to be considered, for the examiner's initials; and (5) a heading that clearly indicates that the list is an information disclosure statement. The information disclosure statement has been placed in the application file, but the information referred to therein has not been considered.

Specification

2. The disclosure is objected to because of the following informalities:

- Page 4, line 18 – Sentence does not make sense, examiner suggests changing to "...when an impairment occurs in the apparatus."

Appropriate correction is required.

Claim Objections

3. Claim 1 is objected to because of the following informalities:

- Line 19 – incorrect tense of "provide", examiner suggests changing to "provided"
- Line 23 – "...distributed to the one of the systems..." does not make sense, examiner suggests removing "the"

- Line 28 – "...distributed to the at least one other system..." does not make sense, examiner suggests removing "the"

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless – (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Laurent et al (US 6,820,715.) Laurent et al discloses an electrical steering for a vehicle with triple redundancy, comprising:

- In regard to claim 1, a steering control apparatus which comprises:
  - A steered wheel drive mechanism including a plurality of motors for driving a steered wheel, wherein the plurality of motors are arranged coaxially, have substantially the same performance, and are driven simultaneously (Column 3, lines 32-39; Column 4, lines 61-63)
  - A plurality of control means, each controlling an associated one of the motors (Column 3, lines 35-39)
  - A plurality of systems configured by the plurality of motors and the plurality of control means, with the control means of one of the systems:

- Generating a first torque command representing torque for turning the steered wheel based on the steering position of a steering wheel and position information of the motor associated with the one of the systems (Column 5, lines 29-43)
- Distributing the first torque command in accordance with the number of the systems to generate one or more divided torque commands, each of the one or more divided torque commands being provided to an associated one of the systems (Column 4, lines 32-39)
- Controlling the torque of the associated one of the motors in accordance with the distributed torque command distributed to one of the systems (Column 4, lines 31-39)

- A control means of at least a further one of the systems controlling the torque of the associated one of the motors in accordance with the distributed torque command to at least one other system. (Column 4, lines 31-39)

- In regard to claim 2, each of the systems further includes an impairment detecting means for detecting impairment of the system (Column 5, lines 14-20), and when one or more of the systems, including the one of the systems generating the first torque command, is impaired, the control means of one of the systems that is functioning normally:

- Generates a second torque command representing torque for driving the steered wheel based on a steering position of the steering wheel and position information of the associated one of the motors (Column 6, lines 15-29)
- Generates one or more distributed torque commands from the second torque command in accordance with the number of the systems that are functioning normally, each of the distributed torque commands generated from the second torque command being provided to an associated one of the systems that is functioning normally (Column 6, lines 15-29)
- Controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to one of the systems that is functioning normally (Column 6, lines 15-29)
- The control means of at least a further one of the other systems that is functioning normally controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to at least a further one of the systems functioning normally. (Column 6, lines 15-29)

- In regard to claim 3, each of the systems further includes an impairment detecting means for detecting impairment of the system, and when one or more of the systems, excluding the one of the systems generating the first torque command, are impaired, the control means of one of the systems:

- Generates the one or more distributed torque commands from the first torque command in accordance with the number of systems that are functioning normally, each of the one or more distributed torque commands being provided to an associated one of the systems that is functioning normally (Column 6, lines 15-29)
- Controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to one of the systems (Column 6, lines 15-29)
- The control means of at least a further one of the systems that is functioning normally controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to at least a further one of the systems functioning normally (Column 6, lines 15-29)

- In regard to claims 4 and 5, the controlling torque of the associated one of the motors includes feedback controlling excitation current of the associated one of the motors, each of the control means having a different current loop gains for the feedback controlling when each of the systems is functioning normally and when one or more of the systems is impaired. (Column 5, line 60 – Column 6, line 29)
- In regard to claim 6, a steering control apparatus for a vehicle having a steering wheel and a steered wheel, the apparatus comprising:

- A plurality of motors for turning the steered wheel, the plurality of motors having substantially the same performance (Column 3, lines 32-39)
- A plurality of control units capable of mutual communication, each of the control units controlling an associated one of the motors, the control units and the motors forming a plurality of systems, wherein each control unit executes mutual communication and determines whether the corresponding system is normal or impaired (Column 5, line 60 – Column 6, line 14)
- A steering sensor for detecting the operating angle of the steering wheel (Column 3, lines 18-19)
- When each of the systems is operating normally, one of the control units:
  - Generates a torque command representing torque required to turn the steered wheel in accordance with the operating angle detected by the steering sensor (Column 5, lines 29-43)
  - Distributes the torque command in accordance with the number of the systems to generate a plurality of distributed torque commands (Column 4, lines 32-39)
  - Provides each of the distributed torque commands to an associated one of the systems (Column 4, lines 31-39)
- Each of the control units controls the associated motor in accordance with the associated distributed torque command (Column 4, lines 31-39)

- In regard to claim 7, when each of the systems is operating normally, one of the control units generates the distributed torque commands, then number of which is equal to the number of systems, and the motors are driven with mutually equal torques in accordance with the distributed torque commands. (Column 4, lines 31-39)
- In regard to claim 8, the plurality of motors includes at least a first motor and a second motor, the plurality of control units includes at least a first control unit for controlling the first motor and a second control unit for controlling the second motor, and the plurality of systems includes at least a first system containing the first motor and the first control unit and a second system containing the second motor and the second control unit (Column 3, lines 33-39), the one control unit being the first control unit:
    - When one or more of the systems, including the first system, is impaired, and one or more systems, including the second system is operating normally:
        - The first control unit stops generating and providing the torque command and the distributed torque commands in addition to stopping the first motor and the second control unit:
            - Generates the torque command representing torque required to turn the steered wheel in accordance with the operating angle detected by the steering sensor (Column 6, lines 15-29)

- Divides the torque command into a number equal to the number of one or more normal systems to generate one or more of the distributed torque commands (Column 6, lines 15-29)
- Provides the one or more distributed torque commands to one or more normal systems (Column 6, lines 15-29)

▪ Each of the control units corresponding to one or more normally operating system drives the associated motor in accordance with the associated distributed torque command (Column 6, lines 15-29)

- In regard to claim 9, when the second system alone is the one or more normally operating system, the torque command and the distributed torque command are the same (Column 4, lines 31-39)
- In regard to claim 10, the steering sensor is one of a plurality of steering sensors, each connected to an associated one of the control units, the steering sensor being connected to the second control unit (Column 5, line 63 – Column 6, line 14)
- In regard to claim 11, the plurality of motors includes at least a first motor and a second motor, the plurality of control units includes at least a first control unit for controlling the first motor and a second control unit for controlling the second motor, and the plurality of systems includes at least a first system containing the first motor and the first control unit and a second system containing the second

motor and the second control unit (Column 3, lines 33-39), which one control unit being the first control unit:

- When one or more of the systems, including the first system, is operating normally, and one or more of the systems, including the second system, is impaired, the first control unit generates:
  - A torque command representing a torque required to turn the steered wheel in accordance with the operating angle detected by the steering sensor (Column 5, lines 29-43)
  - Divides the torque command into a number equal to the number of said one or more normally operating systems to generate one or more of the distributed torque commands (Column 4, lines 32-39)
  - Provides the one or more distributed torque commands to the one or more normally operating systems (Column 4, lines 31-39)
- Each of the control units corresponding to one or more normally operating systems drives the associated motor in accordance with the associated distributed torque command (Column 4, lines 31-39)

- In regard to claim 12, the first system alone is the one or more normally operating systems, the torque command and the distributed torque command are the same (Column 4, lines 31-39)
- In regard to claim 13, the steering sensor is one of a plurality of steering sensors, each connected to an associated one of the control units, the steering sensor being connected to the first control unit (Column 5, line 63 – Column 6, line 14)

- In regard to claim 14, a steering control method for a vehicle having a steering wheel, a steered wheel, and a plurality of motors having substantially the same performance for turning the steered wheel, the method comprising:
    - Detecting an operating angle of the steering wheel (Column 3, lines 18-19)
    - Generating a torque command representing torque required for turning the steered wheel in accordance with the operating angle (Column 5, lines 29-43)
    - Dividing the torque command to generate a plurality of distributed torque commands, each associated with one of the motors (Column 4, lines 32-39)
    - Controlling the motors in accordance with the distributed torque commands (Column 4, lines 31-39)
- In regard to claim 15, a steering control method for a vehicle having a steering wheel (Column 3, line 13), a steered wheel (Column 3, line 24) , a plurality of motors mutually having substantially the same performance for turning the steered wheel, and a plurality of control units, each controlling an associated one of the motors, the motors and the control units forming a plurality of systems, wherein the systems includes a first system containing a first motor and a first control unit for controlling the first motor and a second system containing a second motor and a second control unit for controlling the second motor (Column 3, lines 33-39), the method comprising:

- Checking whether or not the systems are operating normally (Column 3, line 65 – Column 4, line 5)
- Detecting an operating angle of the steering wheel (Column 3, lines 18-19)
- Driving the motors in accordance with the operating angle, the driving including when the systems are operating normally:
  - Generating a torque command representing torque required with the first control unit to turn the steered wheel in accordance with the operating angle (Column 5, lines 29-43)
  - Dividing the torque command with the first control unit to generate a plurality of distributed torque commands, each corresponding to an associated one of the motors (Column 4, lines 32-39)
  - Controlling the motors with the first control unit in accordance with the distributed torque commands (Column 4, lines 31-39)
- When one or more of the systems including the first system are operating normally and one or more systems including the second system are impaired:
  - Stopping the motor associated with each control unit corresponding to one or more impaired systems (Column 5, line 26-29)
  - Generating the torque command representing torque required to turn the steered wheel with the first control unit in accordance with the detected operating angle (Column 6, lines 15-29)

- Dividing the torque command into a number equal to the number of systems that are normal with the first control unit to generate one or more distributed torque commands (Column 6, lines 15-29)
- Providing the one or more distributed torque commands to an associated one of each of the one or more normal systems with the first control unit (Column 6, lines 15-29)
- Driving the associated motor in accordance with the associated distributed torque command with each of the control units corresponding to at least one normally operating system (Column 6, lines 15-29)

o When one or more of the systems, including the first system are impaired and one or more of the systems including the second system are operating normally:

- Stopping the motor associated with each control unit corresponding to the one or more impaired systems (Column 5, line 26-29)
- Generating the torque command representing torque required to turn the steered wheel with the second control unit in accordance with the detected operating angle (Column 6, lines 15-29)
- Dividing the torque command into a number equal to the number of the systems that are normal with the second control unit to generate one or more distributed torque commands (Column 6, lines 15-29)

- Providing the one or more distributed torque commands to an associated one of each of the one or more normal systems with the second control unit (Column 6, lines 15-29)
- Driving the associated motor in accordance with the associated distributed torque command with each of the control units corresponding to the at least one normally operating system. (Column 6, lines 15-29)

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- US 5,670,856 to Le et al discloses a fault tolerant controller arrangement for electric motor driving apparatus
- US 2004/0040778 to Katou et al discloses a vehicle steering system with an actuating section which includes a plurality of drive units for producing an actual torque to the steering mechanism.
- US 2004/0007416 to Furumi et al discloses a steering system for a vehicle for applying an auxiliary steering force to a steering system with two motors
- US 6,929,090 to Furumi et al discloses a steering system for a vehicle with a plurality of motors for applying a force to steering road wheels in a steering directions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marie A. Weiskopf whose telephone number is (571) 272-6288. The examiner can normally be reached on Monday-Thursday between 7:00 AM and 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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THOMAS C. BLACK
SUPERVISORY PATENT EXAMINER
GROUP 3600